VIRGINIA WILDLIFE

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Commission photos by Kesteloo

December snow.

VIRGINIA WILDLIFE

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A Monthly Magazine Dedicated to the Conservation, Restoration, and Wise Use of Virginia's Wildlife and Related Natural Resources, and to the Betterment of Hunting and Fishing in Virginia

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Cover

The white-tailed deer is Virginia's most important, plentiful and popular big-game animal. Ed Bierly's four-color painting, with a winter background, is timely for some sections of the state.

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Nature's Christmas Trimmings

CHRISTMAS, the day the Christ child was born, is probably the most celebrated birthday of our present world. In America, the observance of Christmas is a beloved part of our way of life. After weeks of abnormal acceleration, business, industry and the routine chores of everyday living grind to a halt. Church doors are open and people of many creeds from all walks of life go to worship, rejoicing in this unusual birth that occurred in Bethlehem of Judea almost 2000 years ago.

In the Christian world, it is a time of festivities. For days, even weeks, adults and children alike have been excitedly preparing for the occasion. Many families are together for the first time within the year. Banquet tables groan under the weight of food and drink and youngsters squeal with joy, their excitement electrifying the air. Homes are decorated with bright lights, colored balls and artificial devices in variety.

These are all fine, but to me Christmas decorations would be incomplete without the greenery from the out-of-doors. The pungent odor of a Christmas tree of fir, pine, or red cedar belongs with the holiday season.

The early pagans, especially the Druids of Europe, are credited with first using a tree in their Christmas rituals. They used the various oaks because of their attached spiritual significance. Later the Christians adopted the fir tree, as its crown or tip pointed to heaven. Hessian soldiers serving with the British army during the Revolutionary War brought with them the idea of decorating the Christmas tree. It was popular, and the practice was copied by the colonists. Today, finding a Christmas tree, gathering holly, mistletoe or running cedar is an integral part of the ritual of the season for many people's yuletide.

This presents a problem, however. A conservation problem. At the present time Virginia, for example, has a population of three million, 579 thousand people and, for comparison, New York City's population is about three times as great. To furnish a Christmas tree, holly and other greenery for every family in America would utilize large quantities of plants yearly. Tree farms and nurseries furnish a number of the needed evergreens, and many woodland owners earn a seasonal livelihood through sale of this Christmas verdure. Some nurseries advertise evergreen trees that are living and balled in burlap. The idea is to use the tree indoors first as a Christmas tree and later to plant it outdoors in the yard or garden as an ornamental. The living Christmas tree idea is a good one. It is a conservation measure and in time would spare many trees that would otherwise be cut annually. These planted trees will furnish food and shelter for birds and other wildlife around the home.

Holly, another favorite yuletide decoration, is at best a slow-growing tree or shrub and does not produce its attractive, red, berry-like drupes until the plant is ten years old. There are some 300 species of holly in the world. It is native to every continent except Australia. The United States has 14 or 15 native hollies and all are confined to the eastern half of the country. All occur characteristically in moist woods. In using the American holly for ornamental purposes, it is essential to have both male and female plants to insure a crop of fruit. The decorative, red, so-called berries are produced only on the female plant.

Holly can be ruined by overzealous cutting although it is a hardy plant, rather resistant to both disease and insect attacks. In any cutting, care should be exercised so as to prune individual trees lightly. The crop should be harvested with tree trimmers and not by hacking with axe or saw. Cuts should be made at the junction of main and lateral branches and should be smooth and clean so that the cleft will heal rapidly. This reduces the chance of rot or insects attacking the plant. Country people should cut holly on their own land and, for good conservation, city people should buy holly branches from respectable dealers who can give assurance that vandalism was not involved in gathering them.

Here in Virginia the mistletoe, of which we have but one native species, is in great demand as a Christmas decoration. It is a flowering parasite and in the South is found commonly on the oak tree as a host plant. The whole plant is used, including the stems and leaves, and is especially desirable when it contains the waxy-like white fruits. Legend has it that when a young swain finds his maiden fair standing under the mistletoe branch, it is a signal to share one kiss for each berry growing on the branch. No doubt this accelerates the demand for the berried stems.

Mistletoe is protected partially by the very fact that it is commonly found in the topmost branches of very large trees and therefore is difficult to collect. Some people resort to shooting it out with firearms, but this method tears up the branches and shatters leaves and fruit.

Some evergreen plants are plentiful, and nature is a bountiful producer if left undisturbed. However, the wounds and scars of hacked plants heal slowly and, often as not, distort and warp. I have seen denuded holly and pines stripped of their branches as far up as the hand can reach and chopped cedars with ugly stubs protruding knee high—not deep in the woods, but on the shoulders of highways within sight of "city limits" signs.

This month, use the greenery from the out-of-doors sparingly in your yuletide decorations. Remember, some of it will grow for a lifetime outdoors in its natural environment but, at best, will be brittle and dead within a few short days in our often overheated homes. The wise use of our resource strength now . . . . . and green Christmas trimmings are a part . . . . . may enable us to leave our progeny the same joy and pleasure of celebrating Christmas in the traditional American way. It is my hope that for another 2000 years they will still be using Christmas trees, holly and mistletoe.—W. C. K.

Commission photo by Kesteloo

Using blinds and decoys is one of the most popular ways of duck hunting in Virginia. Many duck hunters, however, find that "jump shooting" on small streams, ponds and swamps will materially add to their season's enjoyment.

"One Gallus" Duck Hunting

By GEORGE A. GEHRKEN
District Game Biologist

THE "father" of the Virginia Commission of Game and Inland Fisheries, "Mac" Hart, was always primarily interested in benefiting the "one gallus" hunter. Duck hunting has been a traditional part of the hunting in tidewater Virginia since colonial days but, in late years, is becoming an expensive sport for all except those who live near our best waterfowl areas.

For the past six years, the writer has been attempting to find, in his spare time, methods of duck hunting within the financial means of the average hunter. In this period many unfruitful days have been spent in the streams, swamps and ponds of tidewater and piedmont Virginia, but there have been many days when his bag of ducks could be matched against that of any hunter in the state.

It has been found that almost all the streams, swamps and ponds in tidewater and piedmont Virginia have at least a small population of ducks. These ducks, according to abundance, are wood duck, mallard, black duck, teal (mostly green wing), gadwall and pintail. Occasionally one finds canvasback, scaup, bufflehead and coots.

The simplest method of duck hunting is "jump shooting," which entails quietly approaching ducks by either paddling on or walking beside a narrow winding stream or marsh. It is easier to paddle with the tide or downstream, but a motor can be a great asset when returning to the starting point over hunted water. With this method of hunting, you can explore quite a large area in a day and will find certain flats or pot holes that are frequented by ducks. Conceal yourself near these frequented areas and use decoys to attract the birds. If the areas are heavily used by ducks and there is not a blind within five hundred yards, you may construct and license a blind after the landowner's permission is secured. There are also certain fields that the ducks use, usually during the late evening and early morning. Again, with the landowner's permission, you can conceal yourself near the field and await their arrival with or without decoys.

The minimum equipment needed is a hunting license, duck stamp, shotgun and a small boat. Other pieces of equipment that may be acquired over a period of years are hip boots, one-half to one dozen decoys, a duck call, retriever and possibly a motor.

The best way to launch a campaign for such hunting is to paddle the nearest, reasonably narrow, crooked streams in your area. If your first run is successful, you will be a confirmed "jump shooter." Of course you may see plenty of ducks and not get any shots. If so, you can plan another campaign in the same area. If the stream has very few ducks, try another.

If you have exhausted the supply of streams, secure permission to try swamps and ponds in your vicinity. Paddle or wade these ponds and swamps as you would to jump shoot on streams. After you have explored the ponds and swamps, you will find that there are several

A few decoys, plus taking advantage of the natural cover in the area, will greatly increase the success of your hunt.

Ponds, swamps and streams should not be hunted more than once a week. Additional hunts make the ducks wary, and they often stop using the area.

spots that the ducks use. Now you can call for help. When you next hunt the area, have hunters stationed at these spots when the time for shooting starts in the morning. The ducks will "trade" between these spots for a half hour to two hours, and good shooting will be had by all. A few decoys, plus taking advantage of the natural cover in the area, will greatly add to the caliber of the shooting. A word of caution: hunting these ponds, swamps and streams more than once a week makes the ducks extra wary and sometimes will cause them to stop using the areas.

In this type of shooting, you will not see hordes of wheeling waterfowl as on Back Bay or other concentration areas, but if your shooting is average you will end the Season with more ducks per day than the 1.2 duck daily average of the 1954-55 bag check at Back Bay. The writer averaged a duck for every two hours of this type hunting in 1954.

There are several complicating factors that might tend to eliminate some hunters from this sport. The majority of these factors, if understood beforehand, can be eliminated by proper preparation.

Paddling a boat is hard work and it is not legal to shoot waterfowl from a motor boat unless it is beached, lying at anchor or tied to another blind. This can be avoided by arranging transportation several miles downstream or jump shooting with the tide and attaching the motor for the return trip from the marsh.

It chills one to the bone sitting motionless, peering around the bend, always ready to kill that mallard drake when he frantically puts yardage between himself and the gun. This discomfort can be minimized by carrying enough clothing to keep warm while sitting and by removing part of the clothing when it is time to paddle.

You must be quick at identification because the majority of the ducks on many of the streams are "woodies" and only one a day is the legal bag. Most of the time the wood duck squeals upon being startled and flies with head held high and bill pointed noticeably downward. Although the wood duck is only of medium size, it is, in the opinion of many, the most delicious bird and the male is indisputably the most beautiful of all waterfowl.

On some streams in tidewater and piedmont Virginia, carrying a loaded gun in a boat during the deer season is prohibited. These laws were not passed to curtail duck hunting, but to prevent illegal hunting. You should check the game laws, but usually there is duck hunting permitted before and after the deer season.

The best days for jump shooting are foggy, rainy ones when the visibility and hearing of the duck are limited by the elements.

The ducks seem to be increasing their use of the corn, soya bean and grain fields in tidewater and piedmont Virginia. Of course, these fields are natural growth and not baiting areas. The observant hunter can find some good field shooting in sections which have been planted for farming. The hunter must be clearheaded and steady of hand to bag his limit in this short, sweet and "razzle-dazzle" type of shooting.

The hardy, one gallus hunter who is willing to match his wits against the ducks in their own element will find hours of pleasant recreation and many delightful meals.

From the Arctic Circle to the Rio Grande an unprecedented outdoor fever has seized American trappers—thanks to the ways of a little ball of fur in the marshes and the glamour eye of the modern woman

Million Dollar Rat

By J. J. SHOMON

THE Virginia Indian who squeezed out a living netting shad and trapping muskrats along his native Pamunkey River held a certain fondness for the cattailed marshes and their furred inhabitants and was eager to tell of them to the visiting fur buyer.

"Those 'rat houses over dere," he said, pointing, "they worth mon-ee. If me had a thousand acres, me buy dis reservation."

"You mean," questioned the fur man from the city, "they're really worth that much? Seems they're mostly mud and rushes. . . ."

Pamunkey Joe was not joking. He was serious. He knew good marshland when he saw it, knew what it would produce. The way he had it figured, a thousand acres could produce several thousand 'rats . . . maybe 5,000 in a good season, and at two dollars a skin, well . . . that's more than any Indian could ask from the Great Father.

Commission photos by Kesteloo

But Joe wasn't the only trapper for whom the marshes held a strange fascination. There were thousands more like him. Everywhere, from one end of the continent to the other, thousands of other American trappers still have the same feeling. Each year, from November through January, vast throngs of them can be seen combing the mud banks and waterways of creeks, rivers, ponds and marshes of the continent where the muskrat makes its home. It's a kind of gambling fever that seizes the trappers and, thanks to women's vanity, results in a take of 12 million muskrat skins a year—the biggest fur harvest of its kind anywhere in the world.

And a fever it is, as everyone will tell you where 'rats are trapped in quantity. Down in the bayou country in Louisiana where trapping is a top-ranking business, thousands of Creoles, Sabines, Cajuns and others take their 'rat trapping seriously. The opening fur season finds great crowds of them pushing their houseboats into the marsh country, loaded with provisions, and families hopefully looking forward to gleaning their share of the state's great fur bonanza. Most of them remain a couple of months or until the season runs out or the fur loses its prime, then come out loaded or broke. These Louisiana trappers—some 25,000 of them—collect each year some three million muskrat skins, the largest take of any state in the country. Catches per family or trapper range from good to poor. Some make as high as $5,000 a season, others barely make expenses. A few gamble away all their skins. "It's all in the marsh you get, and how the rats are running," says Anton. "If you have a good marsh with plenty of food, steady water and not too much 'coon, you clean up. This year we had poor luck," he says dejectedly, "too much wind, water change; killed out many young. Ah, but last year! That was the season. Francois and I make good, make enough to buy a houseboat."

Across the country, up in Canada, trapping the muskrat, too, is big business. Here the muskrat ranks second only to the beaver as the big fur of the Dominion. Best skins come from Rice Lake in southern Ontario where

Fifty years ago muskrats weren't worth skinning. Today their skins are the most talked-about fur in the industry.

the pelts are the silkiest found anywhere in the world. One farmer, who owns 200 acres of marshland bordering the famous lake, says that "this trapping business keeps me in cash all winter long, especially when I can't do much on the farm. What with prices around four dollars a skin, why should I try to do anything else?"

Fifty years ago muskrats weren't worth skinning. The little brown rodents were a plain nuisance, destroyers of dams and dikes, a headache to the farmer and engineer alike. Today their skins are the most talked-about fur in the industry. Or as one trapper in Minnesota put it, "a furbearer with a million-dollar coat."

In the big markets, like New York's gigantic fur center between 23rd and 33rd streets where better than 90 percent of the country's raw fur business is located, they have high praise for the muskrat. "The 'rat," buyers say, "has been our salvation. Always a steady fur, reliable, popular, it has pulled us through many a bad year when the long-haired furs passed out of the market." Other market men claim the muskrat has been so dependable over recent years that it has become the staple of the trade and a sort of barometer for the whole fur business.

Known earlier in this country as *muskquash*, the muskrat gets its name from a pair of perineal glands located near the base of the hind legs which release a strong but not too unpleasant odor of musk. The fluid was once used in medicines but now has little value. Some trappers, however, collect the musk sacs and bottle them up for scent and use the lure to draw other muskrats to their traps during the trapping season.

In America the muskrat distribution is very wide, ranging all the way from the Arctic Circle to Florida and Mexico. Although a true rodent, it is better adapted to live in water than on the land. Some mammalogists divide the muskrat family into as many as 14 groups or species, but these are quite similar, varying only in color and size.

Probably the most fascinating thing about the muskrat, other than the glamour it lends to women's coats, is the way it lives in the marshes and along stream banks. Few are the people who have never seen a dome-shaped muskrat house in a tidewater marsh or in a pond. These structures are built of water plants and rushes and serve primarily as winter homes. The muskrats living along stream banks, however, prefer to construct galleries in the mud banks along the river.

To illustrate the two methods of house construction, one should inspect the separate locations where muskrats live, the streambank and the marsh, and see how they go about building their homes.

In a high stream bank there is only one method of construction, a gallery type of house whose entrance is under water. The muskrat begins to tunnel under the water in the bank, driving his tunnel inward and upward until he nears the top. If he runs into roots or discovers that he's near the surface, he cuts a tunnel to one side and excavates another chamber, a living-room-like place which is lined with grasses. On the opposite side of this room is another chamber, usually beneath some rushes or roots and to which is added an air vent for ventilation.

The building of a lodge house in the marshes takes quite a different blueprint. If there are no banks, the muskrat builds a foundation of grass, weeds and sticks, plastering these with mud. Using this same material, he carries the wall of his house up to a dome until it rises two to three feet above the floor of the marsh. Frequently when muskrat families are big they will pool their efforts and build a grand lodge, sometimes making it four to six feet high. Inside the house there is some thorough planning and interior decorating. Chambers are constructed with great uniformity, air vents are carefully planned, and rooms are lined with soft warm grasses for sleeping. All this is done above the water line although meticulous care is taken so that there will be connecting tunnels to the water. This makes for easy escape when danger threatens and proves a good avenue to water and food.

In cold weather when the marshes freeze over, the muskrat finds it perfectly safe to go down under the ice in search of roots and stems of aquatic plants. He is particularly fond of sweet flag, lily, cattail and wild parsnip but will eat clams and mussels when available. When the ice covers the pond, he carries his food into the dining room in the lodge where he can munch upon it in leisure and still breathe easily. Muskrats, while remarkably aquatic in habit, can stay under water only a few minutes at a time and must surface frequently like a seal for oxygen. In warm weather the muskrat prefers to do his dining outdoors, using one or several spots on the bank

for his eating. Muskrats are clean of habit and very sanitary about their premises.

I once had a good opportunity to study a live muskrat for two days and was amazed at its almost human-like ways. This muskrat was taken alive from a trap by a game warden and was later to be used as evidence in a case against a man caught running an illegal trapline in a marsh. After a day of imprisonment in a barrel, we took him out to a nearby pond for liberation. During the night previous to his release we fed him carrots, celery and other vegetables, but by morning found that he hadn't touched a thing. Dismayed at his hunger strike, the warden and I decided to give him his freedom. Taking the little fellow to a pond, we decided to tie him down at first and get some pictures. As soon as he left the barrel and felt the softness of the marsh and smelled the surrounding rushes, he picked up a cattail root and began chewing on it eagerly, forgetting all sense of discomfort and danger, and made no effort to get away. After thoroughly gorging himself on rootstocks, he became aware of his personal appearance and promptly began to wash his paws and face like a child. Face washed, he sat back on his haunches and, in full view of us, began to comb his fur with his front paws. This continued until he was as slick and shiny as a cat, then he decided it was time to move on. When we released him, he took off slowly with a loud smack of the tail and went off into the water like a beaver. He soon came up, looked around, then snaked on across the pond on an exploration trip, apparently none the worse for his strange experience.

One week later the warden caught the guilty culprit on the trapline, and he was heavily fined for trespassing on another man's property and for poaching. Our pet muskrat, meanwhile, was probably well on his way to starting a new colony of muskrats.

The muskrat by nature is a traveler. In late summer, moved by love, he develops a terrific wanderlust and begins moving about frequently, sometimes great distances. He may go here for a while, build a burrow or cabin, then leave it half finished and go elsewhere, repeating the process until he finds just what he wants and decides to settle down for the winter. Families run big. Often there are as many as three to five litters, four to a litter, being born every year to a pair of muskrats, although the average family is six to eight 'rats a year. Usually the first litter is born in April, followed by a second in June or July and possibly a third in August or September. This is average. The number of litters increases in the south, due to the longer season.

During the summer and early fall the young muskrats remain with their parents with contentment although not exactly under their protection. In spite of the heavy birth rate, muskrats are just about holding their own where the trapping is not too heavy. Shot and trapped heavily on the continent, countless numbers of them are also destroyed by owls, hawks, foxes, raccoons and minks. In sections of the country where the wild mink is particularly abundant, it is common knowledge that this predator gets its full share of young and old muskrats. That a mink will attack a full grown muskrat cannot be disputed. Many trappers have seen these two aquatic creatures in combat, with the muskrat invariably losing out.

To many farmers, trapping is only a side line to be indulged in when fur prices are high and farm work is caught up.

I once watched a mink and a muskrat battle it out in a pond. A student at the University of Michigan at the time, majoring in wildlife management, I was running a study strip on furbearers on a farm in Wastenaw County. From signs and tracks I could tell that muskrats and mink were using the same stream and one day, unexpectedly, I saw the two meet face to face. I was following a creek to a bigger stream when I suddenly heard some commotion in a bend in the river. Dropping to a crouch, I eased up to the disturbance and there witnessed an amazing spectacle. A big brown mink, fully two feet long, had a death grip on a muskrat. He was holding the 'rat by the throat while the spunky muskrat raked his throat and chest trying to get loose. The mink kept up a furious attack at the muskrat's jugular vein and blood was commencing to trickle down the mink's nose. The two just tumbled around and around on the sandy bank until the muskrat, breathless and with energy spent, gave up the struggle. The mink then promptly disemboweled his adversary, only to be startled and disappear in the stream.

Trapping the muskrat for fun and profit is a national institution in America. Trappers can be lumped into three classes. There's the farm boy who picks up pin money running a string of traps along a river bank or in a pond. His catches are usually small, but in the aggre-

(*Continued on page* 26)

Conservation Demands That in Your Hunting You

Shoot To Kill . . . . Not To Maim!

By DAN E. CANTNER
Special Services Officer

THERE is no excuse for the large amount of crippled game left to die in our fields and woods each year! The hunters themselves should take the initiative in putting a stop to this useless waste of a great resource. They must learn the importance of clean killing, stalking, and trophy hunting and thus stop a slaughter that is neither wise, sporting, nor humane.

The careless use of a shotgun or rifle can transpose a beautiful deer into a gory mass of broken bones, pierced eyes, and hanging intestines. A rifle-blasted turkey or a maimed and crying rabbit or goose is a hideous sight and the image should remain with the hunter for years.

Today's weapons and improved loads have a terrific amount of killing power, even at long ranges. The wounding of an animal can be blamed only on one thing—*the hunter!* If a gun is aimed properly and true, most any game will die a sure and sudden death. Careful aiming and good judgment are all it takes to make clean killing a reality!

An analysis of the modern hunter presents a discouraging picture when compared with his forefathers. Since the introduction of firearms in this country, gunsmiths have constantly been improving the rifle and shotgun. During this evolution the hunter has, in most cases, gone in the opposite direction: he has regressed in his hunting skills. A tendency with the majority of hunting enthusiasts today is merely to stumble through the woods and blast anything that moves. When put into practice, this can produce only one thing—a huge waste of a harvestable resource. Many hunters are also needlessly wounded or killed during these forays on our wild creatures.

Research work on deer in many states has revealed an extensive loss due to crippling during the hunting season. It was found in Wisconsin that for every 100 legal bucks removed from a section of the Chequamegon National Forest, 68 legal and illegal bucks, does, and fawns were left in the woods dead or badly wounded. In the book *The White-tailed Deer in Wisconsin* (1956), it is estimated that during an antlerless season the crippling loss runs between 17 and 22 percent of the legal kill. The publication *A Survey of California's Deer Herds* (1952) indicates that crippling losses (all ages and sexes) run between 20 and 40 percent of the legal buck kill.

The days of the meat hunter are now history. The American hunter can no longer derive his pleasure solely from the meat in his hunting pocket. To get the most out of his yearly hunts, the sportsman must learn new arts of hunting skill. These skills include stalking, trophy hunting, and clean killing.

There is a large amount of personal pride involved when a man knowingly outwits a wild animal in its native surroundings. To successfully follow trail signs and approach to within a desirable killing range requires a great amount of skill. Expert animal trackers are not born with this ability; they must acquire it through incessant practice. Patience also helps.

Clean killing of game should be a simple process. The important point to remember is that the hunter must stay calm during the aiming and firing process. Deer hunters, after missing or wounding their prey, often trace the flight of the bullet and find that the target was overshot. Many hunters sight-in their rifles for 100, 200, or even 300 yards. *Most shots taken at deer are at distances of less than 100 yards!* Naturally, at this range the gun would be sighted too high. The average hunter has a natural tendency to shoot high under normal conditions. This tendency, in conjunction with the rifle being sighted-in for long range, is almost sure to make the hunter shoot over the target.

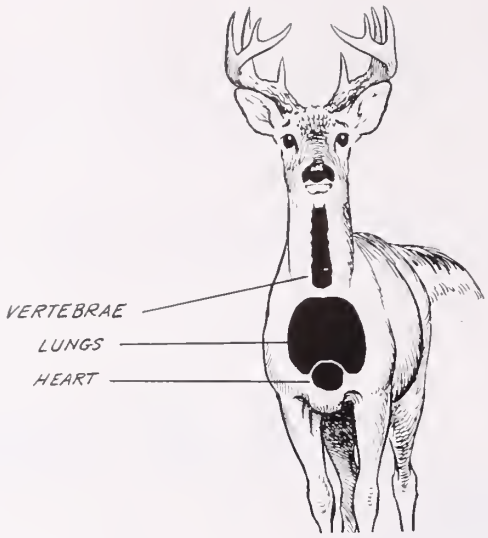
The vital areas on big game are the brain (usually not shot because of the damage to a trophy head), the spinal column, the lungs, and the heart. A well aimed low shot just behind the front shoulders will usually be fatal to a deer, for the heart of a big buck is located approximately 28 inches off the ground. Make sure the front and rear sights are lined up before squeezing the trigger, and aim at the vital area. Then if you shoot high, chances are the spinal column will be shattered. A shot fired at a deer approaching the hunter should be fired at the same height. The high shot in this case will break the neck vertebrae and insure a clean kill.

The vital area on a bear lies in the same position as that of the deer. In most cases, however, the shot will have to be lower since the bear is not as tall as a deer.

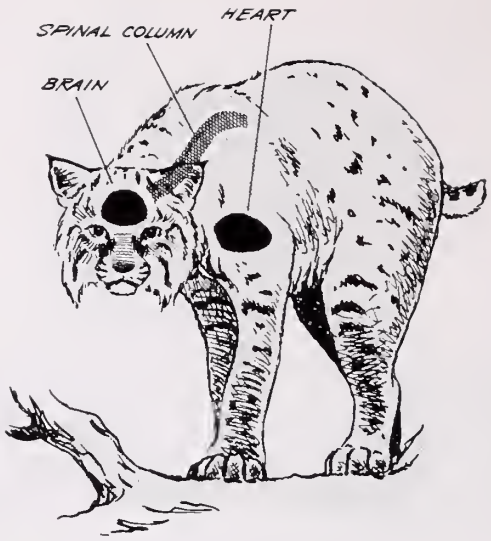
Clean-killing smaller mammals such as foxes, bobcats, and rabbits is similar to the method used on larger animals. The only difference here lies in the smaller target and consequently a smaller vital area. Squirrel hunters using .22 rifles with scope sights can easily break the neck on each animal. If the hunter ordinarily aims "at the middle" with a .22, hollow-point shells should be used. A "gut" shot with a solid-point slug often means a lost squirrel left to die painfully in a hollow tree.

Long-range shots should never be attempted by the amateur. Know the killing range of your gun and don't try to extend it. This holds true especially when wing-shooting upland game birds. Most hunters fail to give a bird the proper lead and, as a result, shoot behind the target. Quite often the bird is hit somewhere behind the wings and flies on only to die later. It is better to over-lead a flying bird. The shot string (the shot that spreads out as it leaves the barrel) may lag behind and cover a distance of several feet, depending upon the distance of the target. If the first pellets miss the target, the bird may fly directly into the last part of the shot. Since the head and neck regions are the most vulnerable parts of a bird, overleading often pays off. Turkeys are killed quite often with only one shot in this region. If the range isn't too great, a straight-away shot usually results in a broken wing. This produces an addition to the game bag, provided the bird can be located. A thorough and systematic search should always be made for a cripple. A good dog is a mighty useful piece of hunting equipment for this type work.

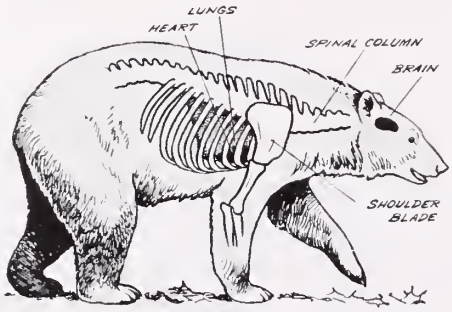
Too, the dog is especially important in retrieving cripples on doves and waterfowl. A wing-shot dove, running on the ground, is next to impossible for the average hunter to locate. If the bird dies during this running



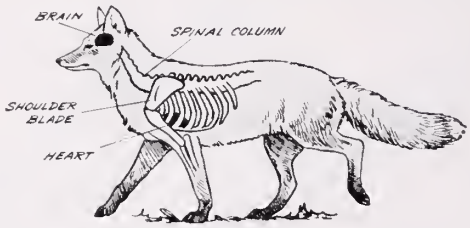
An important point in "clean killing" is to aim low. Most hunters have a tendency to shoot high and thus usually miss vital zones.



If the head isn't to be used as a trophy, the brain is a sure spot for a fast, clean kill.



A shot through the front shoulder should be avoided because of damage to the meat. Try for the spinal column, heart or the lung area.



On smaller game the same vital areas are present. The big difference lies in the smaller, harder-to-hit target.

maneuver, the chances of not finding it are even greater. The result is a great number of crippled doves left in our fields each year.

If a boat is available, badly crippled ducks or geese are comparatively easy to retrieve from the water. If, however, they manage to glide shoreward and hit land, the chances of finding them without a dog are slim. The keen nose of a good retriever is an asset to any hunt.

Thus, in summary, the important steps to remember in killing clean are: first, pick your target carefully and select a vital spot so that the spinal cord, heart, brain, or lungs may be pierced. Keep calm at the moment of aiming and firing. Second, don't try to extend the range of your gun. Third, shoot low on big-game animals. Fourth, overlead but never underlead a winged target. Fifth, learn to stalk wild animals for a close shot and clean kill.

Your pleasures afield can be greatly increased if you strive to improve your hunting skills. Try it!

WHAT IS RESEARCH?

"Research" is a high-hat word that scares a lot of people. It need not. It is rather simple. Essentially, it is nothing but a state of mind — a friendly welcoming attitude toward change. Going out to look for a change instead of waiting for it to come. Research, for practical men, is an effort to do things better and not to be caught asleep at the switch. A research state of mind can apply to anything: personal affairs or any kind of business, big or little. It is the problem-solving mind as contrasted with the let-well-enough-alone mind. It is the composer mind instead of the fiddler mind. It is the "tomorrow" mind instead of the "yesterday" mind. — From *Texas Game and Fish.*

Some of the finest hunting in Virginia is found on the George Washington National Forest. The U. S. Forest Service and the Commission of Game and Inland Fisheries entered into a cooperative agreement in 1938 to produce better hunting and fishing on national forest lands.

Commission photos by Kesteloo

Action Beyond the Blue Ridge

By J. E. THORNTON

Game Biologist Supervisor

THE two national forests in Virginia comprise the largest area of public land in Virginia managed by one organization. Together, the Jefferson and the George Washington forests cover approximately one and one-half million acres of forest land west of the Blue Ridge Mountains. Almost a million of this is to be found in the George Washington National Forest.

The George Washington contains some of the finest range for deer, bear, wild turkey, ruffed grouse, raccoon and other lesser game species in the state. The U. S. Forest Service, owner of the land, and the Virginia Commission of Game and Inland Fisheries, custodian of the wildlife, pooled their resources and "know how" in 1938 and entered into a cooperative agreement to work together to produce better hunting and fishing for the sportsmen of Virginia and the nation.

On the George Washington there are thirteen game management units of approximately 30,000 acres each. From one to three of these units have been established on each ranger district, with a resident game manager in charge of each. Habitat improvement work—consisting of the development of new clearings, the restoration of old homesites, abandoned fields and log landings to good wildlife habitat, construction of wildlife trails and hunter access roads, distribution of salt licks, and other activities —occupies about 60 percent of the game managers' time. This portion of their time is financed primarily through Pittman-Robertson funds, which are derived from a federal excise tax on sporting arms and ammunition. The other 40 percent of the managers' time is occupied with enforcing the game and fish laws on or adjacent to their units, the stocking of fish and game, and predator control. This is financed by money derived from the sale of the national forest stamp and supplemented by regular Commission funds.

In the field, the Commission is represented by two district game biologists and a supervising biologist. It is the responsibility of these men to plan and supervise all of the wildlife work done on the forest. The district biologist works on the ranger's level, working out the details of all tentative improvements before they are undertaken, getting the ranger's approval, and then seeing that they are done according to agreed-upon plans. He is the immediate supervisor of the game managers within his assigned area. The supervising biologist works through the supervisor's office and is responsible directly to the chief of the game division for all project work and other game division activities within the forest area. In addition to the national forest project work, the Commission's biologists are responsible for all other phases of the game division's program in their respective districts. These include such activities as the farm game

program on private lands, work with sportsmen's clubs and the officials of the various counties, trapping and stocking of game birds and animals, including wild turkey, quail, and beaver. In addition, the game biologists have assumed a great deal of the responsibility for the fish division's activities on the forest since this division has had, until the present time, insufficient personnel in the field to handle such work.

The last few years have been marked by continued development and improvement of wildlife habitat on the George Washington National Forest and a consequent increase in its use and in wildlife harvest by both hunters and fishermen. According to U. S. Forest Service figures, approximately 355,000 man days were spent on the forest by hunters and fishermen last year in pursuit of their sport. Increased use of the forest by big game bow hunters was also reported, and liberalized seasons for bow hunters in the state in recent years promise them an even greater use of the forest lands.

The counties within which the "G. W." is located consistently lead the state in all the forest game species for which there is an accurate record. For example, Shenandoah County is at the top in deer kill in the state. Augusta County is usually first in the number of bear killed and is not far behind in the deer kill. Bath County has led the state in wild turkey kill for the past two years and gives promise of holding this lead.

Large numbers of shrubs and trees are planted each year for wildlife food. Many of these plantings are in the experimental stage to discover their usefulness to wildlife.

A large number of clearings, varying in size from one to three acres, are scattered throughout the forest. This is one very beneficial phase of the habitat improvement program.

Nearly all habitat improvement work done on the forest is now done on a "mechanized basis." Heavy bulldozers are used in all land-clearing operations, in most instances on a rental basis from private operators. All such projects are written up by the biologist concerned and this written plan is approved by the district ranger before actual work is commenced. Most of the development projects done in this manner consist of a series of wildlife clearings, from one to three acres in size, connected by a trail suitable for jeep or truck travel. Water holes are also built in conjunction with the clearings wherever suitable locations are found. The trails built in connection with the clearing operations are proving of great value by making remote areas on the forest accessible to wildlife workers and sportsmen. In this way, they are contributing toward a more equitable harvest of the game animals and game birds on the forest.

Drought conditions have existed for three years in the general area of the forest, and the water shortage has been critical in most of the mountain areas of the state. The consensus of wildlife workers has been that development of water holes, enlargement of seepage areas, and improvement of existing springs are most desirable and of considerable value to game, especially during periods of low rainfall. Water has also been found to be a principal factor in the distribution of raccoons, as they normally reside in its vicinity. Observations around water holes already built tend to substantiate this. Evidence, too, of extensive use by deer, squirrel, wild turkey and bear has been found around all water holes and some evidence of use by waterfowl. It is conceivable, then, that the presence or absence of water in large blocks of forest land may be the factor which determines whether or not wildlife can exist in a given area.

The proper distribution of salt throughout the deer range on the national forest has become an important tool in deer management. When properly distributed, salt licks have a tendency to attract deer to the forested areas, away from crop lands, thus reducing crop damage caused by too many deer in the wrong places. This also results in a decrease in illegal kill along forest roads.

All of the newly created clearings and trails are seeded to some form of permanent sod as soon as is practical after the clearing operations are completed. Most are seeded to a mixture of ladino clover, rye grass, orchard grass, rye, rape or a similar mixture. Arrangements have been made to secure orchard grass screenings from a local seed cleaning house, and to date the screenings have proven satisfactory for use on the proper soils, shoulders and middles of the wildlife trails and hunter access roads. The only cost of such screenings consists in getting them from the seed cleaning house to the forest for distribution.

Where evergreen cover is lacking, groups of white pine, red pine, or other coniferous trees are planted to supply this need. In some instances white pine reproduction, where already present, is released by girdling the hardwood overstory. A number of food and berry-bearing shrubs are planted each year. Some of these species are mulberry, pecan, grape, and apple. Most of these may be considered "experimental" and are planted to discover their practical use in the wildlife program.

The native American chestnut was formerly one of the most valuable forest trees in eastern United States. Its disappearance from the mountains of Virginia, caused by the chestnut blight, was a major catastrophe from which wildlife and mountain residents have not yet fully recovered. It has long been recognized that the only hope of restoring the chestnut's former range is through the introduction of blight-resistant hybrid seedlings. The Commission of Game and Inland Fisheries and the U. S. Forest Service have planted a large number of these blight-resistant seedlings during the past years, and they are now beginning to show some results. A number of these three and four year old trees are at present over ten feet tall and a few have produced chestnuts. Older plantings, those of the CCC days, have grown into forest-sized trees and produce a crop of chestnuts each fall.

The use of basal spray as a means of controlling undesirable hardwood sprouts on wildlife clearings and trails is becoming standard practice on the forest. A check on results indicates that at least a 75% kill has been obtained on the treated areas. In addition, mowing operations to control weed and sprout growth on clearings are carried on each summer to improve the growth of green food on the open areas within the forest.

In spite of the large amount of work which has been done to the forest in the past, the average hunter and fisherman know very little about who is responsible for the work or the nature of the work being done. To help get the story across to the public, a series of six different signs was designed and these have been placed at appropriate locations throughout the forest area to indicate wildlife clearings, wildlife trails, water holes, cover plantings, camp sites and national forest lands. All of these signs point out the fact that the work carried on there by the Game Commission and the U. S. Forest Service is for the benefit of wildlife. In addition, a series of rustic signs has been developed to mark the principal entrances to all game management units and also point out the cooperative nature of the work being done.

The game manager has become a key figure in the Forest Service organization for forest fire prevention and suppression. In addition to taking an active part in reporting and suppressing forest fires, his duties include issuing campfire permits, fire warnings and spreading the gospel of forest fire prevention. In this way, many contacts are made with hunters and fishermen during the hunting and fishing seasons.

The importance of the game manager in the role of game and fish law enforcement has, within the last few years, taken on new significance. The county warden has come to depend on the game manager for a great deal of help in law enforcement work on the national forest lands in his county, thus leaving the warden more time for work in other areas of the county. Too, the game manager has made himself available to the game warden when extra help has been needed at night or on special patrol. In short, the game manager has assumed a key position in the law enforcement work of the county in which he works. The record of arrests and apprehensions for the year 1954-55 indicates that a total of 81 arrests in which the game manager participated were made on the George Washington forest for game, fish and trapping violations. This phase of the game manager's work is receiving more recognition each year.

Trapping game animals and birds for stocking other suitable habitat has become an important "side line" activity on the forest. For example, in two separate years, forty deer have been trapped on the North River Refuge for stocking other areas in the state which are in need of additional breeding stock. A number of wild turkeys were trapped on the Big Levels Federal Refuge last year for stocking in southwest Virginia. These native wild turkeys, after release in suitable habitat such as exists in much of southwest Virginia, are proving most valuable in reestablishing the bird to much of its former range. In connection with this, the release of pen-raised wild turkeys has helped to restore them to areas where they have long been absent. The trapping and transfer of beaver and black bear—the latter for reasons of science—have also become commonplace activities on the forest.

The national forests of Virginia are furnishing hunting and fishing to an ever increasing number of people each year. The wildlife development program, as it is being conducted on the George Washington National Forest by the Game Commission and the U. S. Forest Service, is geared to provide sport and a reasonable bag and creel of game and fish to sportsmen. New techniques and management ideas are being tried in an effort to make the program even more effective. With intelligent management, this publicly owned land should continue to provide a major source of outdoor recreation to Virginians and visiting out-of-staters for a long time to come.

More State Conservation Magazines

There are now 39 states which use conservation magazines as a tool of fish and game management. The newest member of the group is Massachusetts. Since 1949 it put out mimeographed sheets but now it has transformed itself into a crisp pocket size magazine called *Massachusetts Wildlife*.

Dabbling ducks are caught in traps placed in shallow water close to the shore line. These ducks are examined, banded and released.

A banded duck shown in flight shortly after being liberated. Successf
Commission of Game and Inland Fisheries, 7 N. 2nd St., Richmond,

BACK BAY . . . WATERI

Many of the waterfowl that funnel down the Atlan
Virginia's eastern coast. Here thousands of birds are
to determine the possibilities of rehabilitating birds su
of the work being done by experienced wildlife worke

Ducks, geese and swans pick up expended shot pellets, primers from shells, nails and other assorted material when feeding on the bottom near shooting areas. Shown here are the crop contents of a swan.

Commission

Waterfowl specialists utilize a suction apparatus to remove the crop contents from a whistling swan. A glass tube is inserted to reach the crop area.

ers who bag banded birds in Virginia should send the bands to the
he United States Fish and Wildlife Service, Washington 25, D. C.

The diving ducks are taken in a modified clover-leaf trap placed in deep water. The banding of ducks helps waterfowl biologists study their movement along the various flyways.

WL WINTER RESORT

way stop to rest and feed at sprawling Back Bay on
ed, and last year a limited experiment was conducted
ng from lead poisoning. These pictures portray some
o use the area as a vast outdoor laboratory.

A band is secured on the leg of this ringneck duck. Banding not only helps biologists check on movement but the band returns sometimes give information as to the longevity of individual birds.

t by Kesteloo

Two convalescent whistling swans in a holding pen on the area. These birds gained weight and apparently recovered completely from a case of lead poisoning.

Commission photo by Kesteloo

One of the most important game species in Virginia is the cottontail rabbit. Habitat improvement is believed to be the key factor in increasing the number of rabbits.

A Closer Look at the Cottontail Rabbit

By JOHN B. REDD, JR.
District Game Biologist

THE cottontail rabbit is one of our most important game species. Youngsters for generations have stalked and killed this animal as their first trophy, but the hunting of the cottontail is a sport enjoyed by hunters of all ages. They are hunted with guns and with dogs and are sometimes trapped. The cottontail relieves the hunting pressure on other forms of wildlife, supplies a quantity of delicious meat and plays the most important part in the increasing popularity of the beagle hound and field trials.

For many years clubs and other interested individuals have made attempts to increase rabbit populations by the liberation of rabbits imported from other states. Even state game departments, acting under pressure from sportsmen's groups, tried such restocking, using both rabbits trapped within the state and purchased from other states, but without any apparent success. Experience gained in Pennsylvania and New York has proven that the cost of such an undertaking is not practical. Work in these two states also has shown that rabbit populations can be more successfully increased with habitat management, rather than by restocking.

Another problem that confronts the various state agencies is the introduction of the so-called "San Juan" rabbit from islands off the coast of Washington. So far, attempts to introduce this rabbit into various states have not increased the rabbit population, although they have been reported to have overwintered in some of the northern states. Since this species is a descendant of the European rabbit and possesses many of its undesirable traits, its introduction and liberation should be condemned. This species is not considered to have the sporting qualities of the native cottontail, and its burrowing habit, which results in extensive tunnels, is detrimental to normal agricultural practices. A regulation of the Commission of Game and Inland Fisheries prohibits the liberation of the "San Juan" rabbit in Virginia.

Species Distribution in Virginia

Virginia is fortunate to have three species of the rabbit present within its boundaries. The most abundant species is that of the cottontail (*Sylvilagus floridanus*), which includes three subspecies found throughout the state. The other two species are the New England cottontail (*Sylvilagus transitionalis*), which is found at the higher altitudes throughout the mountainous regions, and the marsh rabbit (*Sylvilagus p. palustris*), which is confined to three southeastern counties. Cottontails are abundant about brushy borders of cultivated land, whereas the New England cottontail is more of a woodland species. The marsh rabbit, on the other hand, has aquatic habits, living primarily in wooded swamps and marshes and taking to water as freely as do muskrats.

Life History

The normal breeding season for the cottontail in Virginia extends from about mid-February to September. Ecke, working with the cottontail in Illinois, found that there seemed to be a rather close correlation between the limits of the breeding seasons and the availability of succulent vegetation. The male usually becomes sexually active several weeks earlier than the female. During the period of courtship the male is always the aggressor and normally pursues the female.

The female sometimes may dig her cup-shaped nest as much as a week before the young are born. If it is her first pregnancy, the female may make several false nests before the final one is constructed. The nest is dug in the ground and lined with grass or other vegetation and fur from the body of the female. The gestation period

Trapping and tagging operations have given the biologists a large amount of useful information for better management of the cottontail.

seems to vary, but the average is 28 days. The female is capable of breeding again soon after the birth of her young. The average number of litters per female for each breeding season in Virginia is thought to be four.

The size of the litter varies from three to eight rabbits, but the average is four or five per litter. A mature female may produce from 20 to 25 young per season if conditions are ideal, but in nature this number is seldom if ever attained. If most of the young born of each female survived to the hunting season, there could be more than a 1000 percent increase in the rabbit population from the previous spring.

The young are blind at birth, helpless, and have very little fur. They remain in the nest for approximately 15 days, and during this period the mother remains in the area near the nest and returns to nurse the young at dusk and dawn. As the young rabbits grow, they make short trips from the nest. After they leave the nest they stay in the vicinity for several days, during which time they may return to the nest to be fed.

The mature female is a little larger than the male. On the average, adult rabbits weigh from two and one-half to three pounds. Due to a high degree of mortality among rabbits, the average life span is about one and one-half years and very few rabbits live to reach four years of age.

Habitat

Cottontails are more abundant where conditions are such as to provide a mixture of agricultural lands of different vegetative types. The most desirable areas contain cropland, grassland, woodland, and areas in various stages of abandonment. Rabbits are primarily nocturnal in habits. When an area has an abundance of natural cover, the rabbit makes a "form," in which he conceals himself during the day. Where concealing vegetation is not adequate, they use brush piles or abandoned groundhog holes and hollow logs. They come out of hiding at dusk to feed on tender green vegetation. Ideal habitat for the rabbit contains brushy wood borders or grown-up fence rows near cultivated lands, for here the rabbit finds adequate escape cover adjacent to the succulent vegetation upon which he feeds. During the winter, the rabbit makes use of woodchuck burrows as escape cover from his enemies and as shelter from winter weather.

Food

It has often been stated that it would be easier to list those foods which a rabbit would not eat rather than to comprise a list of that which he does eat. In general, a rabbit's diet consists of succulent herbaceous materials, fruits, seeds, buds and the bark and foliage of woody plants. The food preference of rabbits seems to vary with the different regions of the country. The normal diet during the spring and summer months is comprised of approximately 75 percent succulent herbaceous materials, with different grasses forming the bulk of this amount. During the fall months there is a gradual change-over to the winter diet of buds and bark of woody plants. The cottontail's tastes for young garden and truck-farm plants are well known and an abundance of rabbits in such areas can cause a great deal of damage. During periods of winter weather, rabbits may do appreciable damage to orchards and young nurseries by girdling trees and pruning young stock. Damage can be minimized if the prunings from the trees are piled throughout the orchard so that the rabbits may feed upon these throughout the winter rather than destroy the living plants.

Mortality

The rabbit is a source of food for a great number of predators, both furred and feathered. If it were not so prolific, the rabbit would be eliminated by its many enemies. Man is responsible for the destruction of nests during plowing and mowing operations. Skunks destroy the young if they, by chance, come upon the nest in their wanderings in search of food. Also, nests are destroyed

(*Continued on page* 25)

The female digs a cup-shaped nest and lines it with grass or other vegetation and fur from her body. Three to eight rabbits may be found in a litter.

V.C.C. photo by Flournoy

The large amount of paper manufactured in the United States each year requires a tremendous amount of pulpwood. Our forests should be managed properly to insure a continuous supply of timber for this and other uses.

Principles and Problems Relating to Conservation of Renewable Resources*

By J. O. ARTMAN, *Staff Forester*
Tennessee Valley Authority

THE earth has been whirling about the sun for something like two billion years. In contrast, the unearthed remains of Pekin man are only about 500,000 years old. This puts his age at no more than 1/400th of the age of the earth. To put it in terms a little more understandable, if the earth were one week old, Pekin man would be about three minutes old.

So you see, the earth got along without mankind for most of its history, and it could get along without human beings for the rest of its history. But the reverse is certainly not true. Man cannot get along without the earth, its plants and its animals. It supplies the air he breathes, the water he drinks, the food he eats, the clothes he wears, the fuels that warm him, and the materials that shelter him.

In the beginning man was at peace with his environment. His wants were few and easily satisfied. As he advanced in knowledge, as he learned to cultivate the soil, domesticate animals, use tools, clear forests, build cities, he began to work at cross purposes to nature. In some cases the changes he wrought were so devastating that the land became barren and he had to move to fresh territory.

Such is our heritage. Such was our way of life until a mere second ago in geologic time. But the world is pretty well populated now. There is no new territory. From here on we must use the resources at hand to sustain us and our progeny.

Conservation in America

The New World has never lacked conservationists. From the Mayflower Compact to the Conservation Foundation, there have always been those with the ability to analyze man's relationship to nature and warn him of the consequences.

But for the most part they were voices crying in the wilderness. Even as late as the nineteenth century there was little congressional action to indicate any public

*Speech presented at Conservation Workshop, Chattanooga, May 7, 1956, sponsored by the Joint Council on Economic Education.

concern over natural resources. The government disposed of the public domain at a rapid rate and made no pretext at establishing a land policy.

Not until the advent of the Theodore Roosevelt administration did conservation get its first real impetus. He lent the movement the prestige and power of his office. He gathered about him such stalwarts as Charles R. Van Hise, president of the University of Wisconsin; James R. Garfield, Secretary of the Interior; and Gifford Pinchot, chief of the newly created Bureau of Forestry. They wrote and talked conservation into public awareness.

Then came World War I, the phenomenal rise of petroleum in our economy, and a technological revolution in agriculture and manufacturing. In such a setting it was difficult to convince the layman that there could be a shortage of anything.

Franklin D. Roosevelt was in the White House when depression and general unemployment of the early thirties sparked the second great boom in conservation. Land planning began in this country with the Soil Conservation Act of 1933. The National Resources Planning Board produced a comprehensive resource inventory and analysis of our economy. The Taylor Grazing Control Act (1934) set up machinery for supervising grazing on 80 million acres of the public domain. The Civilian Conservation Corps put half a million young men to work on flood control, reforestation, and other conservation projects. The Tennessee Valley Authority Act was our first attempt to develop all the resources of an entire watershed as a unit.

But again a war interfered. The hands of the conservation clock were not only stopped, they were turned back. Never before in history was there such a lavish expenditure of resources as occurred in World War II. We can recoup some of our losses but the supply of coal, oil, copper, zinc and all the other exhaustible resources is just that much less than it was before. Nothing we can do can add one iota to the world inventory.

Since World War II there have been hot wars, cold wars, and changes in the political scene that have retarded a concerned swing back to the conservation job. Iron curtains and bamboo curtains have disrupted the world flow of goods and ideas. Food surpluses in this country have overshadowed the fact that millions of our brothers go to bed hungry each night.

Importance of Conservation

But the importance of conservation is no less today than it was at the turn of the century or in the early thirties. Valuable top soil still thickens our rivers after each rain storm. The air is still fouled with dust from the Great Plains. Our forests are less than one third as productive as they could be. Wildlife dwindles and insect plagues still increase. Underground water reservoirs continue to recede, and rivers are still polluted with industrial and domestic waste.

In the very first textbook on conservation (1910), Van Hise saw conservation as the most important problem before the American public. I believe the same is true today. What can be more important than assuring a continuing supply of the elements that support our economy, our society, our very lives? In the last analysis, nothing will avail us if our resources are gone—neither scientific know-how nor military prowess.

If you accept this premise, then you must also accept the importance of education as a means to the end. What challenges the nation must of necessity challenge the nation's schools.

Conservation cannot be legislated into general acceptance because it intimately touches man's way of life. It imposes responsibilities along with democratic freedom of action. Hence it will not work until man discards some old ideas and adopts some new ones. This is a job for education. And the job is so big and so important that it must reach from kindergarten to university. In addition, it must somehow be brought to bear on those who have passed beyond the academic circle. We cannot wait for a new generation of land managers and captains of industry.

Principles

What are the objectives of conservation education? What are the new ideas to be planted in a student's mind?

Here I may overstep the field of renewable resources because to me the philosophy of resource use is the same for all resources, be they renewable, exhaustible, or inexhaustible. It's a way of life that looks beyond the here and now, that abhors waste in any form, that respects and protects property regardless of ownership, that accepts the golden rule as a practical, everyday guide for action.

Sometime ago I ran across an article by Vernon Carter in the *Journal of the National Education Association*. In it he listed some objectives of conservation education. I believe they adequately cover the principles involved in the conservation of all resources.

S.C.C. photo by Busch

Many farmers, realizing the importance of saving their topsoil, now practice strip cropping and contour plowing. These measures greatly reduce destructive soil erosion.

1. *Natural resources are being depleted.* This, first of all, involves an undestanding of what resources are. The average student doesn't recognize a resource when he sees one. He may have some vague idea about how wood is cut from some remote forest, how oil spurts from a hole in the ground, or how some waters yield salmon. But he has little notion of the relative abundance of these resources or how they contribute to the economic picture.

Every student should become familiar with the story of how man has evicted himself from one region after another by destroying the resources that support life. And you don't have to go to the Near East or China for examples. There's one not 60 miles from Chattanooga — 25 square miles of eroded desolation that is literally a desert. This is the Copper Basin, where man's mining activities denuded the land and left it exposed to the elements. It's unbelievable that such a thing could happen in the lush southern Appalachians. But it did happen and it is happening elsewhere when the protective mantle of vegetation is removed from the land.

Yes, it should be the responsibility of every American citizen to know the history of resource use and abuse. He should understand generally the rate of use and renewal.

2. *America does not have an inexhaustible supply of resources.* Certainly it is time to destroy the idea of America's inexhaustibility. A handful of pioneers may have had good cause to believe there was no bottom to the barrel. But 300 years later the picture is quite different for a mature nation of 165 million people.

I have three sons. As with most fathers, it has been my lot to help them occasionally with their studies. I find geography and history books still bragging about our supply of resources and our productive capacity. If waste and depletion are mentioned, their significance is lost in the rosy glow of self commendation.

This is wrong. There is a bottom to the resource barrel. And everyone should act accordingly, husbanding resources that are in short supply and substituting wherever possible those that are renewable.

Every student should learn to recognize waste and understand its consequences. We teach our children thrift and the value of money, but we neglect to tell them that money is a byproduct of resources, that if there were no resources there would be no money, that natural resources are the basis of all wealth.

We Americans suffer from a tremendous urge to do things in a big way. Each manufacturer must each year produce more than he did the year before, even though the gadget he produces contributes little or nothing to human well-being. And instead of one manufacturer there may be ten, twenty, or fifty producing essentially the same gadget. This is the American Way. This, we say, is what makes the United States the greatest nation on earth. Well, it can also bankrupt us.

No, our resources are not inexhaustible. It behooves us to take stock and live within our means. A ceiling on production is not the worst thing that could happen to us.

3. *People, other animals, plants, and their environment are closely interrelated.* How we treat one resource inevitably affects another. Forests, for example, anchor the soil and help control the flow of water, both over the ground and into it. This same water, carrying minerals with it, flows into lakes and streams. The soil minerals nourish minute, free-floating plants and animals, which in turn serve as food for plankton-eating fish, which in turn become food for the game fish so diligently sought by the angler.

Spraying forests with DDT may get rid of some pest, but it may also kill the bumblebee that fertilizes the red clover, that puts nitrogen into the soil.

In primitive times every mineral atom taken out of the earth by plant, animal or man went back to the earth ultimately. Today these minerals are shipped from farm to city. Then sewers carry them into streams and rivers, and eventually into oceans where they are lost to man.

Nature is a seamless web. All resources are interrelated. Man's plans must fit the natural scheme or he will break the balance of nature.

4. *We are not owners of resources, only stewards.* This is not a new idea. In the Book of Leviticus, written almost 1,500 years before Christ, we find the Lord telling Moses how the Israelites are to live in the Promised Land. And he is quoted thus: "The land shall not be sold in perpetuity, for the land is mine; for you are strangers and sojourners with me."

The longest-lived among us are sojourners on the earth a relatively few short years. And no matter how much of worldly goods we claim title to, we can't take it with us when we die. Hence we must conclude that we don't really *own* anything. Mankind has been on this earth something like a million years and will continue to occupy it for millions of years to come. This would seem to indicate that the earth's resources are entrusted to mankind and not to men. We are trustees

One of the real problems of conservation is selling the idea to our educators. The roadblock seems to be inserting conservation training into the overcrowded curriculum of our schools.

or stewards and must consider the rights of generations of trustees yet to come. Every man should leave his little bit of property in as good condition or in better condition than he found it.

5. *There is a conflict between individual rights and the rights of society.* In America one can do about as he pleases with any gift of nature he happens to hold in his possession. He can cut down forests, destroy soil, pollute rivers, deface natural beauty, or overgraze grassland as he chooses.

Individual rights have received a lot of attention in this country. This, we say, is what our forefathers fought and died for at Bunker Hill, at Verdun, on the Normandy beaches. This is democracy. This is the American Way.

But in this day and time, personal rights must give way when the rights of society as a whole are endangered. Our law books are full of safeguards against *personal* right infringement. We are free to act so long as that freedom of action does not jeopardize the *personal* rights of others. There are few safeguards however, to protect society against the unwise action of individuals.

It should be the function of the schools to teach citizens that no person, group, community, or government has the right to use any resources in a way that conflicts with the rights of society as a whole.

6. *Foreign trade cannot compensate for exhausted resources.* It may for a while and for some materials, but where are we to get the basic resources of soil, coal, oil, wood? How can we buy from nations that have less than enough for themselves? Even if we could, we would become a nation of fabricators, at the mercy of those who supply us with raw materials. Our influence on world affairs would be lost. No, world commerce offers no solace to the nation that refuses to conserve its own resources.

7. *Science is not a substitute for resources.* This is one of the hardest fallacies to dispel. It would seem that science can do almost anything. And scientists have done some truly marvelous things. But the scientist must still work with raw materials; he hasn't yet made something out of nothing. He can substitute one resource for another, but oftentimes the substitution is in the wrong direction—like substituting relatively scarce diesel fuel for relatively abundant coal, or exhaustible steel for replaceable wood.

The atom offers untold possibilities as a source of energy, but you can't eat this super atom, you can't wear it, and you can't build houses out of it.

However, the scientist can contribute mightily to conservation: he can uncover the natural laws that govern the growth of renewable resources. By so doing he can make two blades of grass grow where one grew before. He can shorten the time it takes trees to mature. He can improve the habitat for wildlife. He can increase the supply of underground water. He may even wring a little more moisture out of the atmosphere.

The role of the scientist is to increase our supply of renewable resources and to encourage their use in place of exhaustible resources.

8. *Local resources determine living standards.* It's amazing how little is known about the economic foundations of community life. Practically every city is what it is because of resources. Pittsburgh developed around the use of coal. Miami markets its climate. Gloucester exploits the Atlantic fishing banks; Tulsa, its oil fields. Hot Springs capitalizes on its underground waters. A seaport made New York City.

Both cities and rural communities come into being and develop because of local resources their citizens can utilize and convert into a comfortable living. If the resources are used up, the community will decline and its inhabitants must move on or be subjected to a much lower standard of living.

These, then, are the major principles bearing on conservation. They are the guideposts that chart our course of action. They are the basic precepts that must govern the educational effort to build in the minds of Americans a conservation philosophy.

Problems

These principles point broadly to the problems. The one big problem, of course, is channeling scientific knowledge into action. In forestry discovering the scientific facts of tree growth and forest management is not the problem. The big problem is persuading timberland owners to apply the knowledge we already have.

The forester's training is based largely on the biological sciences. Yet he finds when he gets out into the field that he has to deal not so much with trees as with people. His dream of a continuously productive resource is denied him, not because he doesn't know how to proceed, but because the owners have other ideas.

Another problem facing conservationists is the American allergy to planning. Just mention the word and the rugged individualists break out in a rash of epithets against bureaucrats, brain trusters, socialists and even communists. If you look ahead to determine the long-range effects of some specific action, you are accused of interfering with private initiative.

But without planning there can be little conservation progress. Conservation means long-range planning of resource use. It means inventorying resources and determining the best use. It means discouraging practices that are wasteful. It seeks to reconcile overlapping uses. It means responsibility instead of irresponsibility.

Personally I can see no harm in planning to eliminate ghost towns, dust storms, erosion, floods, forest depletion and the other ills that arise out of resource misuse.

Of course, another real problem for you involves selling the conservation idea to the educators who establish public school policy and then fitting it into an already crowded curriculum. But that shouldn't be too difficult if you can agree with me that conservation of natural resources is the most important life problem facing us today.

INDUSTRIAL POLLUTION and FISHING*

The acids and chemical wastes from industry are responsible for many of the big fish kills in some areas of the United States.

DOMESTIC sewage has ruined many a fishing stream. But, industrial pollution has done even more damage. In the last fifty years there has been a seven-fold increase in industrial production. This big increase has added tremendous volumes of industrial wastes to our streams.

In the United States, more than 10,000 separate plants are discharging these wastes—food processing, meat packing, textile manufacturing, pulp and paper mills, synthetic fibers, rubber manufacturing, steel, oil and petroleum products, metal finishing, coal washing, and many others.

About 6,000 of these plants discharge wastes which decompose in the same way that city sewage does. And, as with city sewage, the decay removes oxygen from the water, making it unsuitable for fish and fish food. The discharge from these 6,000 plants is equal to the pollution effect from the sewage of about 110,000,000 people. In other words, these 6,000 plants do nearly twice as much harm, pollution-wise, as is done by the 8,000 communities, with a population of 60 million, which discharge raw or inadequately treated sewage into our waters.

In addition to those mentioned above, about 5,000 plants discharge additional inorganic or undetermined types of wastes. Too, about 10,000 tons of acid are draining into the waters each day from mines.

The acids and chemical wastes are responsible for many of the big fish kills which we read about. They are toxic to fish and to the organisms on which the fish feed.

Certain insecticides used on cotton and other plants wash into streams and kill fish and fish foods.

Many industries are spending considerable sums of money to find out how they can prevent polluting the waters. On the other hand, some polluters don't seem to care what happens to the wastes discharged by their plants. Because of the latter, we need strong pollution laws, rigidly enforced.

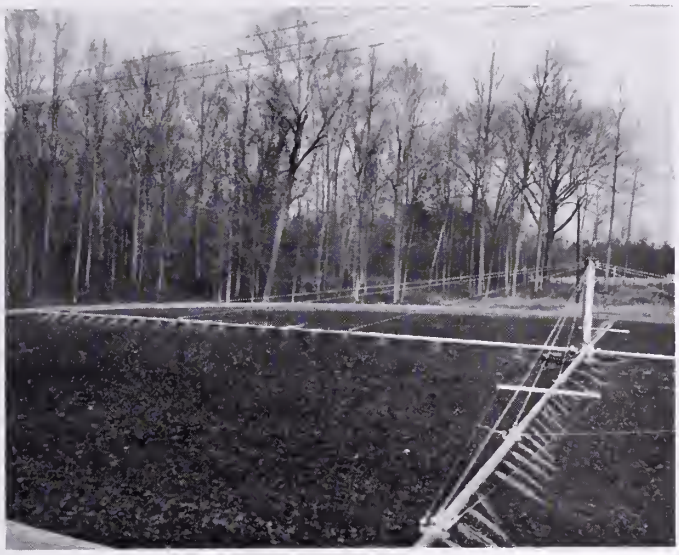
Industrial organic waste can be treated in much the same way that sewage is given primary and secondary treatment by cities with modern sewage treatment plants.

Many industries are learning, too, that much of the material which they have discharged into streams can be converted into valuable by-products. For example, distillery wastes are now used as cattle feeds, and some paper mill wastes are used as road binder. Some of the industries which discharge acids or other toxic wastes can treat them to make them less harmful, or can keep the wastes from discharging into the streams. Some can find valuable uses for these toxic materials.

We must have industrial production, and must maintain and expand it if we are to keep our position of leadership in the modern world and maintain our standard of living. But, we can have both large-scale production and clean waters if we really want both.

You can help prevent pollution, by insisting on good antipollution laws and by calling attention to the polluters; also, by urging the polluters to find ways of discontinuing their destruction of fishing, swimming, and other aquatic sports. An enlightened and determined public can stop most pollution.

*Sport Fishing Institute Bulletin.



Many cities, knowing the disastrous effect of raw sewage on a stream, have installed sewage disposal plants. These plants are a must if we are to clean up our poisoned waters.

If you plan to take a vacation trip, check first to see if the waters you intend to enjoy are unpolluted. The state water pollution control agencies and the U. S. Public Health Service now have the results of an overall survey showing where pollution exists. If the waters you had hoped to visit are polluted, take your vacation elsewhere. But, be sure to indicate to the Chamber of Commerce or tourist bureau why you chose to go elsewhere rather than to its community. The tourist business has become an immense industry. If tourists visited only areas with unpolluted waters, and indicated why they did so, many of our local pollution problems would soon be corrected.

Remember—pollution is a major destroyer of our favorite outdoor sport.

RETURN THOSE BIRD BANDS

Good sportsmen will regard it as their obligation to return bird bands to the Commission of Game and Inland Fisheries, Richmond, or to the U. S. Fish and Wildlife Service, Washington 25, D. C., depending on the information on the band. A memo stating species and sex of the bird, and date and place of taking, should be sent with the band. This procedure should be followed not only in the case of birds taken by the gun, but also birds found dead of natural causes.

Great sums of money are spent annually by the Game Commission and the Fish and Wildlife Service in banding birds and tagging game. Important information on migration patterns, life span, etc., can be gleaned only with the cooperation of hunters. The band or tag will be returned to hunters on request, and the hunter will receive information as to the date and place of banding.

COTTONTAIL RABBIT (*Continued from page* 19)

during periods of prolonged rains when the cup-shaped nests may be flooded over by surface-drained water.

Hawks and owls take rabbits whenever the opportunity presents itself. Great horned owls and red tailed, sharp shinned, red shouldered and Cooper's hawks are known to catch and eat rabbits. Of the mammalian predators, foxes and stray dogs are the most serious enemies of the rabbit. Control of free-running dogs can do a great deal in cutting down this loss.

Another mortality factor to be considered is the annual loss of rabbits on the highways. The rabbit is probably the most frequent victim of all the animals killed by cars and trucks along the hundreds of miles of highways in the state.

Management

The main problem in the management of the cottontail is providing adequate food and cover during all seasons of the year. During the normal growing season succulent vegetation is amply available on most agricultural lands, but the same lands may not provide the necessary food during the winter months.

Two things can be done to assist in the production of a greater number of rabbits on a given area of land: (1) encourage cover of adequate density for use by rabbits at all seasons of the year, this cover being so distributed throughout the area that the rabbit does not have to go more than 200-300 feet from protective cover to feed; (2) provide food during all seasons of the year, but particularly during the winter and early spring. This may be done by properly placed field crops or by food plantings made especially for the use of rabbits.

In areas where natural cover is lacking, inexpensive shelters can be provided with brush piles, logs and unmowed areas. Fencing of farm woodlots and waste or odd areas to exclude grazing helps to provide natural vegetation that is used as shelter by game. Permitting fences to grow up with natural vegetation increases the amount of edge (natural cover) that is used by rabbits, particularly when such cover is adjacent to a good food supply.

In areas where rabbits have to rely largely on buds and woody materials for the greater portion of their winter diet, food plantings of rye or winter wheat are desirable additions. These food patches should always be planted near adequate cover. Food patches of an annual game food mixture (available from the Game Commission), planted near cover, help to provide food for the rabbits during periods of a shortage of natural foods. Pruned branches from orchards piled between the rows of trees supply a source of bark for rabbits during these lean winter months and at the same time prevent damage to the trees present in the orchards. If the supply of cuttings is plentiful enough, it provides both a source of food and of shelter during periods of bad weather.

An assurance of adequate food and cover during all seasons of the year and open areas interspersed with brush areas mean *more* rabbits during the hunting season for the hunter.

 (*Continued from page 9*)

gate they make a sizable figure each year. Then there's the farmer or landowner or the tenant who likes to run a strip of 'rat traps during slack times. To him trapping is only a sideline, to be bothered with when prices are high and farm work is caught up. Finally comes the professional trapper, of which there are some 500,000 in the United States and another 100,000 in Canada. To him muskrat trapping is big business; the product a staple fur, a real money maker, marsh gold. It is to him, too, that the fur industry looks for its furs in bulk.

Trapping the muskrat is a fascinating hobby for most trappers, to others a serious business. The trapper, in making his sets, searches along the borders of streams and the shores of ponds and marshes for likely signs of tracks, for muskrats do not venture far from water when it can be avoided. Usually the trap is set in a runway or at the entrance to a hole, just beneath the water, and a short chain is attached by a ring to a stick or bush. The chain is so arranged that it will slide down the stick but not up it; therefore when the trap is sprung and the animal dives for deep water it will drown. Sometimes a bait is used to lure the muskrat to the trap, but not often. Trappers who are careless about their sets soon learn that muskrats will wring off their legs with ease, only to die somewhere in an underground burrow where they cannot be found. This is poor conservation. Trappers try to be careful so this won't happen and strive to keep "wrung feet" down to a minimum.

Most professional trappers do pretty well when they concentrate their activities on the muskrat and mink in good 'rat territory. Good muskrat marshes will produce a return of ten dollars an acre, better than returns from most forest areas. Take Pamunkey Indian Joe, for instance, situated on the Indian Reservation in tidewater Virginia. Joe traps every year on the Pamunkey marshes and averages 300 to 600 'rats a year, depending on the season. Joe loves to trap, especially in good times when local fur buyers pay him two dollars apiece for his skins. That's good money for muskrat pelts in most sections, and this is not all; there is always an additional twenty-five to thirty cents for the carcass sold to local meat dealers who like to carry it for those who enjoy the delicate flavor of "marsh rabbit."

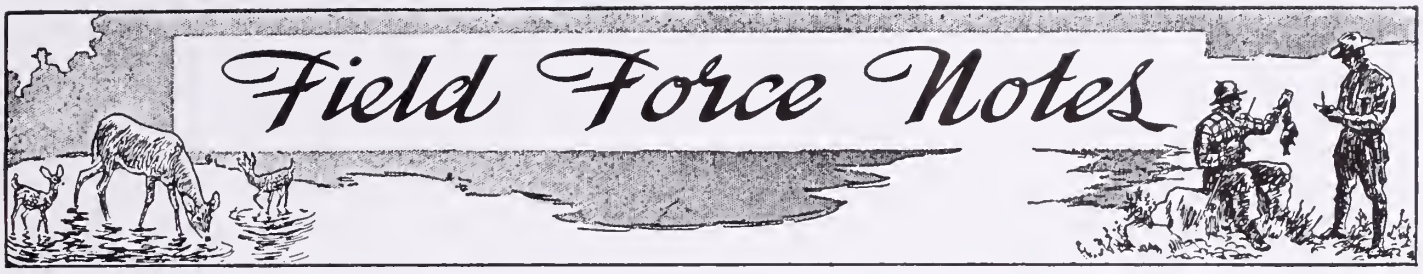
Joe skins his own 'rats and does it with such ease that it is astonishing to watch. I once saw him skin a 'rat in a flat forty seconds . . . and he wasn't apparently hurrying. Some rat trappers prefer to dry their skins and then ship them off to their favorite raw fur houses, mostly in New York. Local fur buyers argue against this, try to persuade trappers to sell their skins to them, claiming better prices. Marketed furs are graded by color, size, primeness of skin, fur quality and other characteristics. They are usually sorted as tops, mediums, flats, kits and mice.

Muskrat production in quantity is a fairly recent thing in America. The fine quality of the muskrat pelage was not generally known until around the turn of the century when special attention was called to it as a result of the steady depletion of the more valuable furbearers. Since this period, prodigious attempts have been made all over the continent to manage the muskrat on a big-time basis. Result: production has been tripled, if not quadrupled. Next to Louisiana's big yields comes Minnesota, boasting a production of well over a million 'rats a year. Other big muskrat-producing states are Michigan, Maryland, Ohio, Wisconsin, Pennsylvania, Iowa, Illinois and New York.

Canada shows some big yields in muskrats. Her production has steadily improved through a policy of intelligent management of muskrat marshes on government reservations. Reports from Manitoba, Quebec and Ontario tell of amazing government rehabilitation work on marshes where muskrat yields have been increased by better than 1000 percent. As an illustration, one Manitoba area of 54,000 acres of marshland several years back had a 'rat population of 300. After four years of wise management wherein the water levels were controlled, the area produced a population of 60,000 'rats. Similarly on the Summerberry Game Preserve, the government increased the muskrat population from 5,000 to 72,000 in two years and no fewer than 200,000 in three years.

In contrast to Canada's amazing progress in muskrat management, the United States has paid little attention to this number one American furbearer. Outside of a half dozen states, where some control is being attempted, little is being done either to conserve the muskrat supply or to place it under intelligent management. Most states have open seasons on the muskrat but, other than limiting the period when animals may be taken, little is being done to protect and perpetuate the future supply. In Louisiana and at the U. S. Fish and Wildlife Service's Patuxent Refuge in Maryland, splendid research work has been done. Studies show that muskrats cannot be raised profitably in pens but need room, as the natural urge of the muskrat is to roam, either for food or to make social calls. Increased production, then, must rest with improving habitat, especially such things as water level control, the creation of ditches to reach additional food supply, the damming of new areas and the planting of special muskrat foods.

This year the New York fur market will again buzz with feverish activity, with the muskrat leading all skins in buying. Good skins, as usual, will come mostly from the colder states—from New York, New England, Michigan, Wisconsin and Minnesota. Black muskrats will bring slightly higher prices than their brown cousins. Southern 'rats will bring the lowest prices. In looking over the skins once more, furriers will look to Canada for the best quality pelts. Muskrats from Ontario and from around James Bay will be in particular demand. But from Rice Lake or Louisiana, Maryland or California, the fur industry will take all the 'rats it can lay its hands on—10 million, 12 million, 15 million. Such is the demand for the multi-million-dollar rat—the skins of which will once again help make up a half-million beautiful ladies' coats selling at $300 apiece.



Wardens Catch Cats with Chickens

One day late last fall, Chesterfield County Game Warden Ed Gorman and Special Warden Mike Ittner went down below Bosher's Dam to dispose of some chicken entrails . . . the smart way.

Soon after the chicken had been proffered as bait, the two catfish pictured below took fatal nibbles. They weighed in at 8½ and 9¼ pounds respectively.

Gorman and Ittner returned the next night and caught twelve more cats that also relished chicken.

Ed Gorman (seated) and Mike Ittner display the two catfish they caught using chicken entrails as bait.

Guide Booklet to Potomac Playlands Now Available

For the benefit and wise use of vacation planners and recreation seekers, a guide booklet of the popular Potomac River Valley has been made available.

It is the book's intention to acquaint more people with the diversified opportunities for fun, rest, and relaxation that will be afforded the visitor to any one of the Valley's many scenic properties.

Among the activities to be enjoyed are hiking, camping, white-water canoeing, river cruises, Tidewater boating, rock climbing, cave exploring, nature study, and of course, unexcelled hunting and fishing. There is a chapter elaborating on each of these, authored by leaders in conservation, nature study, recreation, and forestry, who lend enthusiastic endorsement of the Valley and its attractions.

As it is, too few persons living in Virginia, Maryland, Washington, D. C. and neighboring states realize that one of the nation's finest recreation meccas exists practically in their own back yards.

The booklet, entitled "Potomac Playlands," is obtained by writing to: The Interstate Commission on the Potomac River Basin, 203 Transportation Building, Washington 6, D. C.

Mr. J. J. Shomon, editor of *Virginia Wildlife*, contributed to this booklet by submitting a chapter on hunting.

Virginia to Receive One of Six New Fish Hatcheries

Construction of a $746,000 fish hatchery at Paint Bank, Virginia, will get underway soon as part of the Federal Fish Hatchery program authorized in the last session of Congress.

The program calls for the construction of six new hatcheries in all, two of which are designed for propagation of trout only, two for warm-water fish only, and two serving as combination facilities for both trout and warm-water fish.

The hatchery at Paint Bank will be one of the combination facility type, and provide trout for streams in the national forests in Virginia and part of West Virginia and warm-water varieties for appropriate waters in these same states. The annual production capacity of the hatchery will be 125,000 pounds, catchable size and fingerlings.

Highway No Place for Pedestrian Deer

R. S. Purks, Supervisory Warden for the George Washington District, forwarded the following photo to the Commission without comment, evidently feeling that the picture spoke for itself.

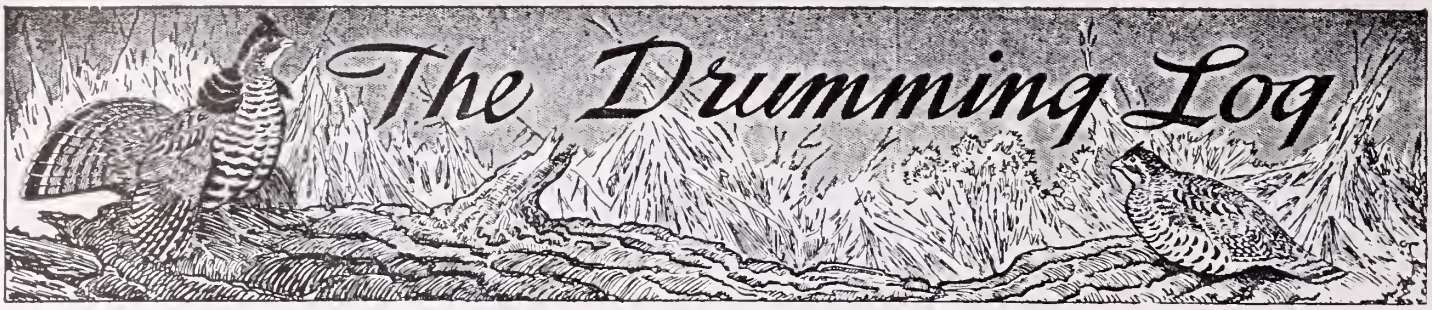
The unintentional bag was made by Marine Pfc. Benjamin Johnson, while driving north on U. S. No. 1 near Dumfries, Virginia. The deer came sailing suddenly out onto the pavement in time to smash through Johnson's windshield leaving the Marine with scalp lacerations and a badly damaged car.

This 4-point buck deer ends up in the front seat of Pfc. Benjamin Johnson's car after being struck on U. S. Highway No. 1.

Dr. Linduska to Head Wildlife Program for Remington Arms

The post of director of wildlife management for the Remington Arms Company has been filled by Dr. Joseph P. Linduska, former chief of the game management branch of the U. S. Fish and Wildlife Service.

As part of his new duties, Dr. Linduska will be in charge of Remington Farms, the company's 2,970 acre tract at Chestertown, Maryland, and will head studies designed to interest and assist the nation's farmers in cultivating wildlife as an important by-product.



Dr. Paul Sanders Honored with Conservation Award

Dr. Paul DeLeon Sanders, for twenty-two years editor of *The Southern Planter,* the "Oldest Farm Paper in America," has been unanimously recommended for The American Forestry Association's 1956 Conservation Award in the Field of Public Information.

Dr. Sander's record as a tireless worker for the conservation of our natural resources is well known. He has written countless articles for magazines, newspapers, trade publications and house organs, and averages close to a hundred major speeches a year. And no other such publication in America has devoted as much space to this subject as has *The Southern Planter.*

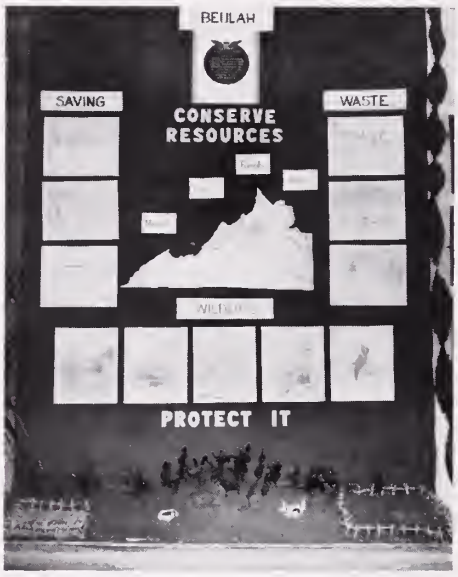
Through membership on the board of directors of numerous business and professional groups, as past master of the Virginia State Grange and president of the Agricultural Conference Board of Virginia, as a present member of the board of directors of Virginia Forests, Inc. and the governor's "Plant More Trees" program, Dr. Sanders has done an immeasurable service in forwarding the cause of conservation and is in large part responsible for many improvements made here and in other states.

In 1954 he headed a committee to study the state's forest resources and the resulting report was considered the most comprehensive study ever made of Virginia's forest resources.

Among the national honors awarded Dr. Sanders for his efforts in conservation are the "National 4-H Club Award," "Honorary American Farmer Degree" from the FFA, and "Crusader for Conservation" by the National Council of State Garden Clubs. In 1955 he received the National Safety Council Award for his eleven-year editorial campaign to prevent farm accidents.

Teacher Puts "Workshop Ideas" to Use

Teacher C. W. Wood, Jr., carried a great deal of information and enthusiasm back to his seventh grade home room, after graduating this summer from the Conservation Workshop held at the Virginia Polytechnic Institute in Blacksburg.



This conservation exhibit, constructed by the seventh graders at Beulah school, reflects the interest of one graduate of the conservation workshop held at V. P. I.

The exhibit pictured above was made by C. W. Wood's seventh graders at Beulah School for the Chesterfield County fair. It would indicate that Mr. Wood's interest and zeal was imparted to his students with very talented and worthwhile results.

The short course, the first of its kind in the state, was initiated by the Virginia Resource Use Education Council in cooperation with VPI and is an effort to advance the cause of conservation throughout Virginia. The course concentrated on Virginia public schools and accordingly sought to familiarize interested teachers with the vital need for more instruction on the subject of the state's natural resources and their conservation.

It is hoped that Mr. Wood's work has set an example that will be followed by other teachers in the state.

Further Color Tests Made for Hunting Safety

Hunters may soon be replacing their red hunting caps and jackets with bright yellow ones, if they wish.

The search for a color that will insure hunters a greater margin of shooting safety has been furthered recently through a jointly conducted test by the National Rifle Association, the California Department of Fish and Game, and the California Optometric Association. The results have it that bright yellow may be the color, as it appeared most readily visible under all lighting conditions.

The tests were conducted in typical deer country with two groups of army personnel participating, ten in a group. One group had normal color vision, while the other had varying degrees of defective color perception. Yellow was unanimously chosen as the most easily detected color.

Fluorescent colors, the incompleted tests reported, were readily visible under bright daylight but made a poor showing in the early hours of morning and evening. This conflicts, however, with findings of similar tests made in Pennsylvania, which indicated that fluorescent fabrics, particularly the orange-red "fireglo" type, showed best in poor light. It is likely that local and seasonal conditions in different areas would have an effect on the tests and probably account for such discrepancies.

For that matter, hunters would do well to wear *either* color, as too many of them disregard such safety precautions altogether. And, in the meantime they should remain grateful for the efforts of those organizations and groups which strive to make the woods a safer place.

Fluoroscope Shows Swan Subject to Hunting Pressure

A fluoroscopic study of 100 trumpeter swans on the Red Rock Lakes Migratory Waterfowl Refuge in Montana has indicated that these rare American birds are being subjected to moderately heavy hunting pressure.

John L. Farley, director of the Fish and Wildlife Service, reports the fluoroscopic study showed that 13 out of the 100 swans were carrying lead pellets in their tissues, despite the fact that the trumpeter is on the totally protected list.

Service officials believe, however, that this is not a case of deliberate hunting but due rather to mistakes in identifying the swans for other waterfowl species such as the snow goose, even though their seven-foot wing spread and larger size should aid in ready identification.

The fluoroscoping study, a cooperative project inaugurated by the Fish and Wildlife Service, was supervised by the Illinois Natural History Survey, a research agency which has done extensive fluoroscoping of waterfowl in the Mississippi Valley. As a result of these studies, the agency has determined that there is a relationship between the number of lead pellets found in the tissues of live birds and the hunting pressures to which birds have been subjected. It was to measure this pressure with regard to alleviating it, that the fluoroscope project was initiated.

One reason for the trumpeter's becoming an endangered species is that its normal winter range, although lying outside the refuge, is known to cross areas where ducks and geese are being legally hunted, thus providing opportunities for accidental shootings. Too, this range and migration embraces a wild and sparsely settled portion of the country, making enforcement of migratory bird legislation for the trumpeter difficult.

But now that the pressure has been definitely established, Fish and Wildlife Service officials will atempt to devise methods for assuring the birds greater protection on their wintering grounds, and hope to preserve this very rare species.

Maine Versus the Buck Law

Another chestnut may be added to the firey controversy concerning the pros and cons of the buck law.

For the past three years, the annual deer harvest in Maine has averaged over 35,000. And the animals have steadily increased in size, weight, antler development, and over-all condition. In 1955, Maine hunters took 837 deer that weighed over 200 pounds each and 55 in excess of 300 pounds.

Maine is a state half the size of Missouri, a state which has never experienced a buck law. To the many hunters in Virginia who still advocate the "traditional" buck law, let this be a lesson in game management. The buck law is excellent in building a deer herd. But once a herd reaches a desirable population in balance with its food supply, both sexes must be harvested in order to maintain a healthy herd. Antler size and body weight are dependent upon the quantity and quality of food available.

"Just testing! Just testing!"

Fish Scales to Become Animal Food

According to John L. Farley, director of the Fish and Wildlife Service of the Department of the Interior, fish scales are digestible and the Service is looking for the best ways to incorporate their high protein value into food for animals.

A way to profitably utilize this heretofore waste material may thus soon be discovered, for the Service has two research studies on the problem now in progress. Previously, some scales were found to be of use in making foam-firefighting materials, but inadequate supply forced manufacturers to look elsewhere. The iridescent matter on fish scales, known as pearl essence, is currently used in the making of jewelry and some kinds of lustrous paints, but only one or two species of fish possess scales suited for such.

However, one of the research studies, at the Fishery Technological Laboratory at College Park, Maryland, has proved that the scales of dried pollack are readily digested by experimental animals such as rats.

The second stage of the study, now in progress at the University of Massachusetts, involves chemical treatment of the scales in order to modify them before feeding them to chickens and rats.

Tree Planting Cooperative Set Up

The United States Department of Agriculture has announced that in order to meet demands for technical help in tree planting, the Forest Service is establishing a Division of Cooperative Tree Planting.

Demands for this specialized activity are expected to increase as a result of the Soil Bank Conservation Reserve program and expanded federal aid to states for reforestation.

Forest Service chief Richard E. McArdle has delegated overall responsibility for the work to assistant chief William S. Swingler.

The creation of this division will provide the Department with the technical forestry assistance needed to administer the conservation reserve section of the Soil Bank. It will also serve to guide and advise states in carrying out expanded reforestation programs on state and privately owned forest lands. Such programs will be planned by state foresters and approved by the Secretary of Agriculture.

Many state foresters have already expressed an interest in the increased federal aid which will permit them to expand their reforestation programs and result in more tree planting on privately owned lands.

In Virginia, from the mountains to the sea, there are areas which, for the best possible land use, should be planted with trees.

Wildlife Questions and Answers

Ques.: **Can anything be done to make the removal of burrs from a long-haired dog a less tiring process?**

Ans.: Before going into the field rub white vaseline on the areas of your dog that seem to accumulate the most burrs. Removing them will be quicker and easier.

Ques.: **I have noticed that your magazine occasionally gives a figure on the number of animals, such as deer, found in our state. How can you give even an approximate figure? There is certainly a lot of land in the Old Dominion and counting these animals seems impossible to me.**

Ans.: Let us again stress the point that our figures are approximate. There are commonly three methods used in measuring a wild animal population: (1) direct enumeration of whole areas or samples of them, (2) ratios based on trapping, banding and later recapture of sample individuals, or (3) indirect observation of the condition or density of population through the use of an index.

As for deer, the amount of suitable range in each county is known and an estimate is made on the number of acres needed by each deer. Using these figures for the entire state, a rough guess can be made on the number of animals we have.

Ques.: **What is the smallest duck that we have in North America?**

Ans.: The female green-wing teal apparently holds the title of our smallest duck. This little fowl averages only 12 ounces in weight, which is extremely small for a duck.

Ques.: **What is the function of the rifling (grooves) in the barrel of a rifle or pistol?**

Ans.: In the manufacture of rifle or pistol barrels, the drilling is followed by reaming to exact bore diameter. The rifling grooves are then cut in a spiral fashion. Usually there are four or six of these grooves present in a rifle barrel, and their depth is only three or four thousandths of an inch. When fired, a bullet enters the barrel and is forced into the rifling. A very tight fit forces the bullet to fill the barrel completely and form a gas seal. The terrific force of the gas pushes the bullet through the barrel and the rifling causes it to rotate or spin. This spinning motion gives the bullet stability and accuracy.

Ques.: **What is the largest reptile living in this day and age?**

Ans.: The largest reptile of modern times is the leatherback turtle. This is a marine turtle and specimens have been found which weighed almost 1500 pounds. This huge reptile reaches a length of approximately eight feet.

Ques.: **Of the game birds found in Virginia, which one has the longest life?**

Ans.: Authoritative records seem to indicate that the wild geese passing through the Old Dominion each year live to a ripe old age. Many of these fowl have reached an age of 70 years.

"I KNOW we're supposed to hunt, but what did we lose?"

Ques.: **Why is the flounder considered one of the strangest inhabitants of our salt water?**

Ans.: Perhaps the strange growth habits of the fish rank it in a separate category. While young, the flounder has its eyes in normal position on each side of the head. As they grow older and start maturing, flounders begin swimming on one side. At this time one eye slowly shifts position and moves over the top of the head. Eventually, this eye comes to rest beside the other.

Ques.: **The boys in my rod and gun club are always arguing over the best type of material for a boat. Many are in favor of fiberglass. What are the advantages of this type construction?**

Ans.: One of the big advantages of fiberglass is its durability. A boat constructed of this material requires very little upkeep. Fiberglass will stand a great deal of punishment from rocks, stumps and other obstructions in the water. These boats can be patched easily and inexpensively if damaged. As with other types of materials, there are various weights of fiberglass offered to the sporting public.

Ques.: **I attended a meeting of my hunt club recently and listened to a representative from one of the leading firearm companies. He stated that each of the company's guns is tested with proof loads before leaving the factory. What is meant by the term "proof load"?**

Ans.: A proof load is a special high-pressure test shell that is fired in each gun before it leaves the factory. These proof loads will produce pressures from 25% to 50% above the average of the heaviest commercial or military load furnished for the pistol, revolver, rifle or shotgun. This is assurance to the customer that the gun is safe enough to withstand the ordinary pressures produced by the heaviest standard loads.

Each arms company has its own symbol or mark which shows the gun has been tested. This proof load method of testing guns originated many years ago in England. Proof marks on guns are easily identified by most sportsmen.

Ques.: **Is there any member of the deer family in which the female has antlers?**

Ans.: Yes. The reindeer are different from other members of this family in that both sexes possess antlers.

Ques.: **A friend of mine informed me that in his home state a boat and trailer weighing over 1500 pounds required brakes for lawful operation. What is the law in Virginia on this matter?**

Ans.: Virginia law requires that any boat and trailer weighing over two tons must be equipped with brakes.

Ques.: **Each year during deer season I look closely for any deer horns that may be lying around in the woods. During the last five years I have found only one set. I am beginning to wonder if the deer actually shed their horns as the game boys say they do. What happens to them?**

Ans.: You are not looking for horns. The structure on a deer's head is an antler. A horn, such as found on a cow, is an unbranched and permanent appendage with a bony case and an epidermal covering of keratin. The antler is a solid, bony structure usually branched, shed annually and renewed each year. The reason you see very few antlers in the woods is because they are eaten by mice and other rodents for the minerals they contain. Incidentally, the game boys are correct. The deer does shed its antlers each year.

Ques.: **I recently heard a duck hunter talking about "blue Petes." What is a "blue Pete"?**

Ans.: This is a common name for the coot (*Falica americana*), a small bird resembling a duck but with a smaller head and a chicken-like bill.

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